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Pesticide Fact Sheet Number 96.1: Diazinon

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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EPA

Pesticide Fact Sheet

Name of Chemical: DIAZINON
Reason for Issuance: REGISTRATION STANDARD
Date Issued: DECEMBER 1988
Fact Sheet Number: 96.1

1. DESCRIPTION OF CHEMICAL

Common Name: Diazinon

Trade and Other Names: Spectracide, D.Z.N., Knox-Out

EPA Shaughnessy Codes: 057801

Chemical Abstracts Service (CAS) Number: 333-41-5

ENT Registry Number: 19507

Year of Initial Registration: 1956

Pesticide Type: Insecticide

Chemical Family: Organophosphate

U.S. and Foreign Producers: Ciba-Geigy, Trans Chemic Industries Inc., and Makhteshim Agan (America) Inc.

2. USE PATTERNS AND FORMULATIONS

Application: Aerosols, sprays, pet collars, ear tags, dips, ground blast, aerial, and soil incorporation.

Annual Usage: 10 million pounds active ingredient (1985 data).

Predominant Use(s): Agricultural, Home and Garden uses.

Types of Formulations: Dusts, emulsifiable concentrates, granules, impregnated materials, liquids, microencapsulated, pressurized sprays, soluble concentrates, wettable powders.

3. SCIENCE FINDINGS

Summary Science Statement

Diazinon is not oncogenic in the Fisher F344 rat or in the B6C3F1 mouse. Diazinon does not induce developmental toxicity in rats or rabbits at dose levels up to and including 100 mg/kg/day (highest dose tested).

Based on acceptable laboratory data, technical diazinon is characterized as very highly toxic to waterfowl on an acute oral basis, with an LD_{50} of 6.38 mg/kg for mallard ducks. Avian dietary studies characterized diazinon as highly toxic to upland game birds with a dietary LC_{50} of 245 ppm for bobwhite quail. Supplemental data characterize diazinon as very highly toxic to waterfowl with a dietary LC_{50} of less than 47 ppm for mallard ducks. End-use formulations of diazinon are characterized as very highly toxic to waterfowl, upland game birds and songbirds on acute oral and dietary basis. Technical diazinon and its end-use formulations are characterized as very highly toxic to aquatic organisms. It is considered highly toxic non-target insects.

Diazinon degrades rapidly under aerobic, anaerobic, aquatic anaerobic and sterile soil conditions. Microbial degradation appears to be the major pathway for the degradation of diazinon. The most probable mechanism responsible for degradation under sterile and anaerobic soil conditions appears to be chemical hydrolysis in acidic soils. Supplemental hydrolysis data indicate that diazinon is stable with respect to hydrolysis at pH 7 and 9 but hydrolyzes in non-sterile water with a pH of 5.

The major soil degradate is oxypyrimidine. Oxypyrimidine is more persistent than diazinon under aerobic and sterile, anaerobic and anaerobic aquatic soil conditions.

Diazinon with a 4 day EC50 of 4.14 mg/L and a 7 day EC50 of 3.7 mg/L is characterized as being moderately toxic to freshwater green alga. Diazinon caused greater than 25% detrimental effect in plant vigor in tomatoes, cucumbers, onions, and carrots. Diazinon caused a greater than 25% detrimental effect in seed germination in oats, tomatoes, and carrots. No detrimental effect was seen for seedling emergence.

Chemical Characteristics of the Technical Material

Physical State: Liquid

Color: Amber and brown

Odor: Mild, sweet, and aromatic

Molecular Weight and Formula: (304.3) $C_{12}H_{21}N_2O_3PS$

Boiling Point: 83-84°C at 0.002 mm Hg

Vapor Pressure: 1.4×10^{-4} mm at 20°C

Density: 1.12 g/ml at 20°C

Solubility in various solvents: In petroleum oils, 60 ppm in water at 25°C and 40 ppm in water at 20°C.

Toxicology Characteristics

Acute Oral: LD50= 618 mg/kg*

Acute Dermal: LD50 > 2000 mg/kg*

Primary Dermal Irritation: Non-irritating*

Primary Eye Irritation: Non-irritating*

Dermal Sensitization: Positive response in 10% of the human volunteers tested*

Acute Inhalation: LC50=3.5 mg/L*

Acute Delayed neurotoxicity: Data gap

Subchronic toxicity: Data gap

Oncogenicity: (mouse and rat) Not oncogenic

Chronic Feeding: Data gap

Metabolism: Data gap

Teratogenicity: (Rabbit and Rat) No developmental toxicity at doses up to and including 100 mg/kg/day.

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* This information may not be applicable to all currently registered manufacturing use products (MUPs) of diazinon. The Agency is requiring additional toxicity studies to determine the toxicological similarities or dissimilarities of the registered MUPs.

Reproduction: Data gap

Mutagenicity: Data gap

Major routes of exposure

Dermal, oral and inhalation

Physiological and Biochemical Characteristics

Mechanism of Pesticidal Action: Cholinesterase Inhibition

Metabolism and Persistence in Plants and Animals: Data gap

Environmental Characteristics

Diazinon degrades rapidly under aerobic, anaerobic, aquatic anaerobic and sterile soil conditions. The major soil degradate is oxypyrimidine. Oxypyrimidine is more persistent than diazinon under aerobic and sterile, anaerobic and anaerobic aquatic soil conditions. Diazinon's potential to contaminate groundwater is unknown.

Ecological Characteristics

Avian acute toxicity:
- 3.2 mg/kg (Red-winged blackbird)-Very highly toxic
- 6.3 mg/kg (Mallard duck) -Very highly toxic
- 10 mg/kg (Bobwhite quail) -Very highly toxic

Avian dietary toxicity:
- < 47 ppm (Mallard duck) -Highly toxic
- 245 ppm (Bobwhite quail) -Highly toxic

Freshwater fish acute toxicity:
- Warmwater LC50 = 136 ug/L (Bluegill sunfish) -Highly toxic
- Coldwater LC50 = 90 ug/L (Rainbow Trout) -Very highly toxic

Marine fish acute toxicity:
- LC50 = 1400 ug/L (Sheepshead minnow)-Moderately toxic

Freshwater invertebrate toxicity:
- LC50 = 0.2 mg/L (Gammarus fasciatus)-Very highly toxic

Marine invertebrate toxicity: Data gap

Non-Target Insects:
- LD50 = 0.22 ug/bee (contact: Honey Bees)-Highly toxic
- LD50 = 0.2 ug/bee (oral: Honey Bees) -Highly toxic

TOLERANCE ASSESSMENT

Tolerances have been established for residues of diazinon in a variety of raw agricultural commodities, in meat, fat and meat byproducts (40 CFR 180.153), food additives (40 CFR 185.1750) and in food handling establishments (40 CFR 185.1750), and feed handling/processing establishments (40 CFR 186.1750). Tolerances for residues of diazinon are currently expressed as residues of diazinon per se.

Codex MRL's, Canadian, and Mexican tolerances have been established for many of diazinon's registered uses. Compatibility of these tolerances to that of U.S. tolerances cannot be determined until all additional metabolism and residue studies are available.

Based on inhibition of plasma cholinesterase observed in a 90 day rat feeding study a NOEL of 0.009 mg/kg/day was established. A provisional acceptable daily intake (PADI) has been established at 0.00009 mg/kg/day utilizing an uncertainty factor of 100. The PADI is provisional because the existing data base on diazinon is lacking chronic feeding studies, and a multi-generation reproduction study.

4. Required Unique Labeling

- o Restricted use Statement for all commercial outdoor uses (e.g., turf, and agricultural).
- o Restricted use Statement for residential products in toxicity category I or II (danger or warning).
- o Homeowner Protection Statements for indoor and outdoor application.
- o Institutional use Protection Statements for hospitals and schools.
- o Feed and Food Handling Establishments statements.
- o Worker Protection Statements for Toxicity Categories I, II and III end-use formulations.
- o 24-Hour Interim Reentry Interval (commercial and greenhouse use).

5. Summary of Regulatory Positions

o The Agency is deferring a decision at this time on whether to place diazinon into Special Review for its potential hazard to avian species resulting from its use on agricultural crops, on turf and other grassy sites (e.g., athletic fields, recreational parks, home lawns).

o The Agency is classifying all commercial outdoor uses (agricultural crops, ornamentals, and turf) of diazinon for restricted use, based upon its known toxicity to birds and aquatic species.

o All diazinon end-use products that are in Toxicity Category I or II (DANGER or WARNING) and bear product labeling that directly recommends residential use or reasonably can be interpreted to permit residential use are classified for restricted use. Such products may be used only by certified applicators or persons under their direct supervision. In the past, the Agency has allowed these types of products to be labeled , "For Agricultural Use Only" or "For PCO Use Only" in an attempt to limit use to commercial or trained applicators. However, these statements are unenforceable.

o The Agency will is requiring the following testing of a series of typical end use products: acute oral, acute dermal, primary dermal irritation, primary eye irritation, dermal sensitization, and acute inhalation if appropriate. The Agency will reserve alternative product formulations testing, pending submission and review of toxicity testing on the stabilized technical diazinon products (manufacturing use products).

o The U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation (DESCH) has determined that certain uses of diazinon, including uses on corn and sorghum may jeopardize the continued existence of endangered species. Based on this determination, DESHC specified reasonable and prudent alternatives to avoid jeopardizing the continued existence of the identified species by these uses. EPA is developing a program to reduce or eliminate exposure to these species to a point where use does not result in jeopardy. PR Notices 87-4 and 87-5, which specified labeling requirements designed to reduce or eliminate exposure to endangered species, have been withdrawn. The Agency will issue a notice of any necessary regulatory actions when the program is developed.

o The Agency will require each registrant of a manufacturing use product to submit the following toxicity studies on their current formulations: acute oral, acute dermal, acute inhalation, primary dermal irritation, primary eye irritation, dermal sensitization, and a 6-week rat feeding study. The Agency may require additional toxicity testing based upon its evaluation of these studies.

o The Agency will impose a 24-hour interim reentry interval for all commercial uses of diazinon (greenhouses, agricultural).

o The Agency is revising worker safety and protective equipment statements for end use products containing diazinon.

o The Agency is not imposing a ground water contamination advisory statement for diazinon products at this time. The Agency will assess the potential of diazinon for groundwater contamination after receipt and review of environmental fate data and will determine whether regulatory action is necessary.

o The Agency is imposing additional statements for all end-use products intended for use in and around the home.

o The Agency has determined that diazinon products must bear revised and updated labeling for hazards to nontarget species.

o The Agency will propose tolerance revocation for rutabagas, red chicory tops, and dandelions (40 CFR 180.153).

o Residue data must be submitted and tolerances must be proposed for corn fodder and forage, and either sorghum forage and fodder, or wheat forage, hay and straw, and soybean straw and hay.

o For the following crops; sorghum fodder and forage, soybean straw and hay, and sugarcane forage, the registrant is given the choice of developing and submitting data in support of tolerances, or of adding label restrictions aganist the feeding and grazing of treated crops to livestock. Each registrant must inform the Agency by 90 days of receipt of this Registration Standard which option he chooses. If he selects the label restrictions, labeling submitted at the 9 month deadline must include the grazing/feeding restrictions.

o The Agency will not grant any significant new tolerances or any sigificant new food uses for diazinon until the required residue chemistry and toxicology studies have been submitted and reviewed.

o The Agency is not requiring additional residue data to support the established tolerances for diazinon in or on guar beans and coffee beans.

o The Agency will revise commodity definitions for certain raw agricultural commodities listed in 40 CFR 180.153.

a) Tolerance listing "peas with pods (determined on peas after removing any shell present when marketed)" will be revised to read, "peas, succulent".

b) Tolerance listing "bean forage" will be revised to read, "bean vines".

c) the tolerance listing for "wheat forage and straw" was omitted from listing and will read "wheat forage and straw 0.05 ppm".

o The common name "diazinon" will appear before the chemical name on the pesticide label. Labels must be revised to reflect this.

o Petroleum distillates and xylene based solvents must be declared as inert ingredients.

o The Agency has identified certain data that will receive immediate review when submitted;

158.240 Residue Chemistry
- Plant and Animal Metabolism
- Special Storage Stability (EUP)

158.290 Environmental Fate
- Hydrolysis
- Photolysis

158.340 Toxicology
- Acute Toxicity Studies (MUP)
- 6 week Feeding study (MUP)
- Neurotoxicity study (MUP)
- Acute Toxicity Studies (TEP)

158.490 Ecological Effects (all)

6. Summary of Major Data Gaps	Timeframe Ranges
Toxicology	12-50 Months
Environmental Fate/Exposure	9-39 Months
Ecological effects	9-30 Months
Residue Chemistry	18-24 Months
Product Chemistry	9-12 Months

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DISCLAIMER: The information in this Pesticide Fact Sheet is a summary only and is not to be used to satisfy data requirements for pesticide registration and reregistration. The complete Registration Standard for the pesticide may be obtained from the National Technical Information Service. Contact the Product Manager listed above for further information.